

**What is claimed is:**

1           1.       A deframing method, comprising:  
2           receiving PPP frame data corresponding to a session number, storing the PPP frame data  
3           in a packet memory in dependence upon the session number, and storing reassembling information  
4           corresponding to the session number, said receiving and said storing of the PPP frame data and  
5           said storing of the reassembling information being performed by a network controller, the PPP  
6           frame data being data conforming to a point-to-point protocol and being fragmented; and  
7           when said receiving has been completed, reading the PPP frame data from the packet  
8           memory and reassembling the read PPP frame data into one integrated piece of PPP packet data,  
9           said reading and reassembling being performed by a point-to-point protocol deframing processor,  
10          said reassembling being performed in dependence upon the reassembling information, the PPP  
11          packet data being data conforming to the point-to-point protocol, the point-to-point protocol  
12          deframing processor and network controller being included in a packet data serving node in a  
13          mobile communication system, the mobile communication system including a base transceiver  
14          station, a plurality of mobile stations linked through radio channels with the base transceiver  
15          station, and a host connected with the packet data serving node through an Internet network based  
16          on an Internet protocol, the packet data serving node connected with the base transceiver station  
17          through general routing encapsulation tunneling based on the point-to-point protocol, the mobile  
18          communication system converting PPP frame data received from the base transceiver station into  
19          IP packet data and transferring the IP packet data to the host, the IP packet data conforming to the  
20          Internet protocol.

1           2.     The deframing method of claim 1, further comprising:  
2           storing de-stuffing information in the packet memory; and  
3           de-stuffing the PPP frame data, said storing of the de-stuffing information being performed  
4 by the network controller, said de-stuffing being performed by the point-to-point protocol  
5 deframing processor.

1           3.     The deframing method of claim 1, with said reassembling of the PPP frame data  
2 comprising:

3           reading the PPP frame data, the reassembling information, and de-stuffing information,  
4 each corresponding to the session number, through a predetermined bus connected to the packet  
5 memory;

6           when stuffed data have been recorded in an information field of the PPP frame data,  
7 performing byte de-stuffing for the stuffed data in dependence upon the read de-stuffing  
8 information;

9           inputting the session number corresponding to the PPP frame data to generate a memory  
10 address corresponding to the session number;

11          temporarily storing the byte de-stuffed PPP frame data in accordance with the generated  
12 memory address; and

13          when reception of all of the PPP frame data corresponding to the session number has been  
14 completed, outputting the one integrated piece of PPP packet data formed of the PPP frame data

15 stored according to the memory address.

1           4.     The deframing method of claim 3, with said byte de-stuffing further comprising:  
2           detecting whether a start flag is in the PPP frame data, and eliminating any start flag  
3           detected in the PPP frame data;  
4           detecting whether an end flag is in the PPP frame data and eliminating any end flag  
5           detected in the PPP frame data, the session number corresponding to a first session number;  
6           receiving a second session number distinguishable from the first session number, and, when  
7           the second session number is received in a state in which the end flag has been detected, reporting  
8           that reception of all of the PPP frame data corresponding to the first session number has been  
9           completed;  
10          when at least one selected from among the start flag and the end flag has been eliminated,  
11          detecting whether the data recorded in the information field of the PPP frame data has been  
12          stuffed;  
13          when the data recorded in the information field of the PPP frame data has not been stuffed,  
14          outputting the data recorded in the information field; and  
15          when the data recorded in the information field of the PPP frame data has been stuffed,  
16          performing de-stuffing for the data recorded in the information field and then outputting the de-  
17          stuffed data.

1           5.     The deframing method of claim 4, further comprising:

2 detecting whether the PPP frame data is normal in dependence upon cyclic redundancy  
3 check information corresponding to the PPP frame data, the cyclic redundancy check information  
4 being obtained after said detecting of whether the end flag is in the PPP frame data.

1 6. A deframing apparatus, comprising:

2 a packet data serving node in a mobile communication system, the mobile communication  
3 system including a base transceiver station, a plurality of mobile stations linked through radio  
4 channels with the base transceiver station, and a host connected with the packet data serving node  
5 through an Internet network based on an Internet protocol, the packet data serving node connected  
6 with the base transceiver station through general routing encapsulation tunneling based on a point-  
7 to-point protocol, the mobile communication system converting PPP frame data received from the  
8 base transceiver station into IP packet data and transferring the IP packet data to the host, the PPP  
9 frame data conforming to a point-to-point protocol and being fragmented, the IP packet data  
10 conforming to an Internet protocol, the PPP frame data corresponding to a session number, said  
11 packet data serving node comprising:

12 a network controller receiving the PPP frame data and outputting the PPP frame data  
13 together with reassembling information in dependence upon the session number corresponding to  
14 the PPP frame data, the reassembling information having been negotiated when a point-to-point  
15 protocol link between the base transceiver station and said network controller is set;

16 a packet memory being in communication with said network controller, said packet  
17 memory storing the PPP frame data and the reassembling information received from the network

18 controller in dependence upon the session number corresponding to the PPP frame data; and  
19 a point-to-point protocol deframing processor being in communication with the network  
20 controller, said point-to-point protocol deframing processor reading the PPP frame data  
21 corresponding to the session number and reading the reassembling information from the packet  
22 memory and reassembling the read PPP frame data according to the reassembling information  
23 when reception of all PPP frame data corresponding to the session number has been completed,  
24 to generate one integrated piece of PPP packet data, the PPP packet data being data conforming  
25 to the point-to-point protocol.

1 7. The deframing apparatus of claim 6, with said point-to-point protocol deframing  
2 processor reading de-stuffing information from said packet memory, and performing de-stuffing  
3 for the corresponding PPP frame data in accordance with the read de-stuffing information, the de-  
4 stuffing information being stored according to the session number by said network controller.

1 8. The deframing apparatus of claim 7, with said point-to-point protocol deframing  
2 processor comprising:

3 an interface interfacing with said packet memory when reception of all PPP frame data  
4 corresponding to the session number has been completed;

5 a direct memory access controller controlling the interface;

6 a reception buffer temporarily storing the PPP frame data transferred by a first bit unit  
7 through said interface and outputting the stored PPP frame data by a second bit unit distinguishable

8 from the first bit unit;

9 a byte de-stuffing processor performing byte de-stuffing for any stuffed data recorded in  
10 an information field of the PPP frame data in accordance with the de-stuffing information and the  
11 reassembling information provided through said interface;

12 an address generator inputting the session number of the PPP frame data to generate a  
13 memory address corresponding to the session number;

14 a memory storing the PPP frame data received from the byte de-stuffing processor  
15 according to the memory address; and

16 a transmission buffer receiving the byte de-stuffed PPP frame data from said memory  
17 according to the memory address and buffering the one integrated piece of PPP packet data to said  
18 interface.

1 9. The deframing apparatus of claim 8, with said byte de-stuffing processor  
2 comprising:

3 a start flag search and eliminating unit detecting whether a start flag is in the PPP frame  
4 data and eliminating any start flag in the PPP frame data;

5 an end flag search and eliminating unit detecting whether an end flag is in the PPP frame  
6 data and eliminating any end flag in the PPP frame data, the session number corresponding to a  
7 first session number;

8 a control data register receiving a second session number distinguishable from the first  
9 session number, and, when the second session number is received in a state in which the end flag

10 has been detected, reporting to said memory that reception of all of the PPP frame data  
11 corresponding to the first session number has been completed;

12 a byte stuffing search unit detecting whether the data recorded in the information field of  
13 the PPP frame data from which header information has been eliminated has been stuffed, and  
14 outputting the data recorded in the information field when the data has not been stuffed; and

15 a byte de-stuffer performing de-stuffing for the data recorded in the information field and  
16 outputting the de-stuffed data to said memory when the data has been stuffed.

1 10. The deframing apparatus of claim 9, further comprising a cyclic redundancy check  
2 and comparison unit detecting whether the PPP frame data is normal by means of cyclic  
3 redundancy check information of the PPP frame data, the cyclic redundancy check information of  
4 the PPP frame data being obtained when said byte stuffing search unit detects whether the data  
5 recorded in the information field has been stuffed.

1 11. A framing method, comprising:  
2 storing PPP packet data and control information corresponding to the PPP packet data in  
3 a packet memory, said storing being performed by a network controller, the PPP packet data being  
4 one integrated piece of PPP packet data and conforming a point-to-point protocol;  
5 reading the PPP packet data and the control information from the packet memory; and  
6 fragmenting the read PPP packet data into a plurality of pieces of PPP frame data according  
7 to size information included in the control information, the PPP frame data being data conforming

8 the point-to-point protocol, said reading and fragmenting being performed by a point-to-point  
9 protocol framing processor, the plurality of pieces of PPP frame data including a first piece of PPP  
10 frame data and a last piece of PPP frame data, with a start flag being inserted into the first piece  
11 of PPP frame data and an end flag being inserted into the last piece of PPP frame data, the plurality  
12 of pieces of PPP frame data being transmitted to a base transceiver station, the network controller  
13 and the point-to-point protocol framing processor being included in a packet data serving node in  
14 a mobile communication system, the mobile communication system including the base transceiver  
15 station, a plurality of mobile stations linked through radio channels with the base transceiver  
16 station, and a host connected with the packet data serving node through an Internet network based  
17 on an Internet protocol, the packet data serving node being connected with the base transceiver  
18 station through general routing encapsulation tunneling based on the point-to-point protocol, the  
19 mobile communication system converting IP packet data received from the host into the PPP frame  
20 data and transferring the PPP frame data to the base transceiver station, the IP packet data  
21 conforming to the Internet protocol.

1 12. The framing method of claim 11, further comprising performing stuffing for each  
2 piece of the PPP frame data when stuffing is required by the control information, said stuffing  
3 being performed by the point-to-point protocol framing processor.

1 13. The framing method of claim 12, with said fragmenting the read PPP packet data  
2 comprising:



3           converting a flag value into a byte value, the flag value being negotiated when a point-to-  
4   point protocol link is set up, and setting the byte value as a reference value, and comparing the PPP  
5   packet data with the reference value to detect an end flag;  
6           determining whether to perform byte stuffing in dependence upon any detection of the end  
7   flag;  
8           performing byte stuffing only for PPP packet data equal to the reference value; and  
9           outputting the plurality of pieces of PPP frame data in accordance with the size  
10   information.

1           14.    The framing method of claim 13, further comprising:  
2           calculating a cyclic redundancy check value for each of the plurality of pieces of PPP frame  
3   data and inserting calculated cyclic redundancy check values in the plurality of pieces of PPP  
4   frame data.

1           15.    A framing apparatus, comprising:  
2           a packet data serving node in a mobile communication system, the mobile communication  
3   system including a base transceiver station, a plurality of mobile stations linked through radio  
4   channels with the base transceiver station, and a host connected with the packet data serving node  
5   through an Internet network based on an Internet protocol, the packet data serving node connected  
6   with the base transceiver station through general routing encapsulation tunneling based on a point-  
7   to-point protocol, the mobile communication system converting IP packet data received from the

8 host into a plurality of pieces of PPP frame data and transferring the pieces of the PPP frame data  
9 to the base transceiver station, the IP packet data conforming to an Internet protocol, said packet  
10 data serving node framing one integrated piece of PPP packet data into a plurality of pieces of the  
11 PPP frame data, the plurality of pieces of the PPP frame data including a first piece of PPP frame  
12 data and a last piece of PPP frame data, the PPP packet data conforming to a point-to-point  
13 protocol, the PPP frame data conforming the point-to-point protocol and being fragmented, each  
14 of the pieces of the PPP frame data corresponding to a session number, said packet data serving  
15 node comprising:

16 a network controller receiving the PPP packet data and outputting the received PPP packet  
17 data with control information corresponding to the PPP packet data;

18 a packet memory being in communication with said network controller, said packet  
19 memory storing the PPP packet data and the control information provided from said network  
20 controller; and

21 a point-to-point protocol framing processor being in communication with said network  
22 controller, said point-to-point protocol framing processor reading the PPP packet data with the  
23 control information corresponding to the PPP packet data from said packet memory and  
24 fragmenting the read PPP packet data into a plurality of pieces of PPP frame data in accordance  
25 with size information included in the control information, said point-to-point protocol framing  
26 processor inserting a start flag into the first piece of PPP frame data and an end flag into the last  
27 piece of PPP frame data and transmitting the plurality of pieces of PPP frame data to the base  
28 transceiver station.

1           16.    The framing apparatus of claim 15, with said point-to-point protocol framing  
2   processor performing a stuffing operation for each piece of the PPP frame data in dependence upon  
3   the control information.

1           17.    The framing apparatus of claim 16, with said point-to-point protocol framing  
2   processor comprising:

3           a control data register outputting a flag value negotiated when a point-to-point protocol link  
4   is established;

5           a stuffing option comparator converting the flag value into a byte value, setting the byte  
6   value as a reference value, and comparing the PPP packet data with the reference value to detect  
7   an end flag;

8           determining whether to perform byte stuffing in dependence upon the detection of the end  
9   flag; and

10          a byte stuffer performing byte stuffing only for PPP packet data equal to the reference value  
11   and then outputting the PPP packet data.

1           18.    The framing apparatus of claim 17, further comprising a cyclic redundancy check  
2   calculation and inserting unit calculating a cyclic redundancy check value for each one of the  
3   plurality of pieces of the PPP frame data and then inserting calculated cyclic redundancy check  
4   values in the plurality of pieces of the PPP frame data.